

REMARKS

The abstract and specification have been amended in order to correct grammatical and idiomatic errors contained therein. No new matter has been added.

The claims have been amended in order to more particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically speaking, Claim 1 now recites that the pretreatment agent comprises a noble metal soap of naphthenic acid or a fatty acid having 5 to 25 carbon atoms and further comprises a silane coupling agent having a functional group with metal capturing ability in the molecule. No new matter has been added.

Acknowledgement of made of the Examiner's indication of Applicants' claim for foreign priority. The Examiner has stated that Applicants have not filed a certified copy of JP 2004-021128 as required by 35 USC 119(b). However, since the present application is a PCT application, the priority document was submitted in the International phase and a notification regarding the submission of the priority document should have been forwarded to the Patent Office. A copy of this was also mailed to the Patent Office at the time of filing the present application. Another copy is enclosed herewith. As such, Applicants respectfully submit that all requirements have been met. If the Examiner has any questions regarding this matter, he is respectfully requested to contact the undersigned in order that it may be resolved.

Claims 1-7 have been provisionally rejected on the ground of nonstatutory obviousness-type double patenting over Claim 5 of co-pending application Serial No. 10/482 092. Claims 1-7 also have been rejected on the ground of nonstatutory obviousness-type double patenting over Claims 9 and 10 of U.S. Patent No. 7 045 461. Claims 1-7 also have been rejected on the ground of nonstatutory obviousness-type double patenting over Claims 9-12 and 14 of U.S. Patent No. 6 740 467. Claims

1-7 have been rejected under 35 USC 103(a) as being unpatentable over WO 01/49898 (WO '898) in view of Yamamoto et al. Claims 1-7 also have been rejected under 35 USC 103(a) as being unpatentable over WO 01/081652 (WO '652) in view of Yamamoto et al. Applicants respectfully traverse these grounds of rejection and urge reconsideration in light of the following comments.

The presently claimed invention is directed to a pretreating agent for electroless plating comprising a noble metal soap of naphthenic acid or a fatty acid having 5 to 25 carbon atoms and further comprising a silane coupling agent having a functional group with metal-capturing ability in the molecule.

As discussed in the present specification, when a conventional pretreatment agent containing a palladium compound, such as palladium chloride or palladium acetate, is used in an organic solvent, which has better wettability than water and excellent applicability and workability, it causes a precipitation problem because of its poor solubility in the organic solvent and cannot provide a uniform and stable solution. This problem is shown in the comparative examples of the present application. The present invention was made to eliminate this problem and to provide a pretreating agent for electroless plating that is soluble and stable in organic solvents and enable the provision of plated products having a uniform and highly adhesive electroless film coating of copper, nickel, tin, silver or the like by electroless plating.

The pretreating agent for electroless plating of the present invention comprises a noble metal soap of naphthenic acid or a fatty acid having 5 to 25 carbon atoms and a silane coupling agent having a functional group with metal capturing ability in the molecule. With this pretreating agent or an ink composition prepared therefrom, an object to be plated is pretreated and then can be subjected to electroless plating to allow an excellent adhesive electroless coating to be formed

on the object. The noble metal soap of naphthenic acid or a fatty acid having 5 to 25 carbon atoms is soluble and stable in an organic solvent and the silane coupling agent allows the noble metal soap to be fixed more uniformly and more securely to the surface of an object to be plated. The pretreating solution comprising these components can be stably kept in an organic solvent without causing a precipitation problem and provides the pretreated object with a catalytic effect. Such a pretreatment agent also has excellent applicability and workability with respect to objects to be plated and can be drawn as an ink with an inkjet. Consequently, it allows electroless plating even on objects which had heretofore difficulty in plating. The electroless plated object is obtained having a uniform and highly adhesive electroless film coating of copper, nickel, tin, silver or the like.

The test results of the examples contained in the present application show that plating films obtained using the pretreating agent of this invention have strong adhesiveness without causing any precipitation problem. In contrast, the pretreating solution of comparative example 1 using palladium chloride as is the case with WO '898 and WO '652 results in a copper plating film with poor adhesiveness and causes the precipitation of palladium while being kept at room temperature. In the case of the pretreatment agent of comparative example 2 containing palladium acetate, which is a soap of a fatty acid having two carbons outside the claimed range, pretreating and electroless plating cannot be conducted because of the precipitation of palladium out of the pretreating solution. These results show that the effects of this invention cannot be obtained without the specified noble metal soap in combination with the specified silane coupling agent.

Claim 1 of the present invention is drawn to a pretreating agent for electroless plating comprising a noble metal soap of naphthenic acid or a fatty acid having 5 to 25 carbon atoms and further comprising a silane coupling agent

having a functional group with metal capturing ability in the molecule. Claims 2-6 and 11 are dependent from claim 1 and also drawn to a pretreating agent. Claim 7 is drawn to an ink composition. Claim 5 of the copending application No. 10/482 092 is directed to a pretreatment agent for metal plating comprising a liquid prepared by mixing or reacting in advance a silane coupling agent containing an azole in a molecule and a noble metal compound.

The Examiner has stated that the silane coupling agent of the instant claims is encompassed by the organic acid salt of a silane coupling agent of application No. 10/482 092. However, this application explicitly states that "it is especially important that the specific silane coupling agent be used in the form of an organic acid salt." and "using the silane coupling agent in the form of an organic acid salt can further enhance the adsorption of the noble metal component to the article to be plated."

Application No. 10/482 092 shows by the results of the examples that when a silane coupling agent is used in the form of "acetic acid salt" good results can be obtained in comparison with the case of using the same silane coupling agent not in the form of an acetic acid salt, i.e., in the form of "non-acetic acid salt" (Table 1 of the reference). It clearly shows that the organic acid salt of a silane coupling agent is a different compound from a silane coupling agent not in the form of an organic acid salt as used in the present invention carboxylic acid and teaches away the use of the silane coupling agent not in the form of an organic acid salt.

The Examiner may feel that an organic acid used for forming the organic acid salt of a silane coupling agent in the reference teaches the fatty acid or naphthenic acid having 5 to 25 carbon atoms used for forming the noble metal soap in the present invention. However, this application teaches acetic acid as an especially preferred organic acid (paragraph [0025] of US 2005/0147755 A1) and actually uses acetic acid in the examples of the reference. Acetic acid disclosed in the

application is explicitly excluded from the naphthenic acid or fatty acid having 5 to 25 carbon atoms of the present invention. Further, in the present invention the fatty acid or naphthenic acid is used to form a noble metal soap but not to form an organic acid salt of a silane coupling agent. Moreover, the noble metal compounds disclosed in paragraph [0027] of the application are "chlorides, hydroxides, oxides, sulfates, and ammine complexes such as ammonium salts of a noble metal such as palladium, silver, platinum, or gold" and they do not teach the noble metal soap of naphthenic acid or a fatty acid having 5 to 25 carbon atoms of this invention. As such, application No. 10/482 092 does not disclose or suggest the present invention and the obviousness-type double-patenting rejection in view of claim 5 should be withdrawn.

Claim 9 of U.S. Patent No. 7 045 461 is directed to a metal plating pretreatment agent consisting essentially of a solution obtained by reacting or mixing in advance a palladium compound with a silane-coupling agent obtained by reacting an imidazole-based compound and an epoxysilane-based compound. Claim 10 is dependent on claim 9. It has been stated that the noble metal soap of a fatty acid having 5 to 25 carbon atoms of the present invention is encompassed by the phrase "a palladium compound" of claim 9 of U.S. Patent No. 7 045 461. This patent mentions, as suitable noble metal compounds, chlorides, hydroxides, oxides, sulfates, ammonium salts and amine complexes of palladium, silver, platinum and gold and, among them, palladium chloride is mentioned as a particularly preferred compound (col. 4, lines 27-33). There is no teaching or suggestion to a skilled person to consider using naphthenic acid or a fatty acid having 5 to 25 carbon atoms with expectation of some desirable effect. A comparison of the examples of the present invention with the comparative examples shows that a pretreating agent using a noble metal soap of the specified fatty or naphthenic acid exhibits superior results over that using palladium chloride, which is mentioned as the most preferable noble compound in the patent,



or palladium acetate, which is a palladium soap of acetic acid having 2 carbon atoms. These test results support that the effects due to the specified noble metal soap would not have been expected from the disclosure of the patent. Therefore, the obviousness-type double patenting rejection in view of claims 9 and 10 of U.S. Patent No. 7 045 461 should be withdrawn.

Claim 9 of U.S. Patent No. 6 780 467 is directed to a pretreatment agent for metal plating which is characterized in that the agent has been prepared by capturing a metal with a silane coupling agent having a metal-capturing functional group in its molecule, and then adding a reducing agent. The remaining claims 10-12 are dependent on claim 9. As in the case of the above two references, this patent fails to disclose Applicants' specified noble metal soap. However, the Examiner is of the position that the noble metal soap of the present invention is encompassed by the phrase "a palladium compound" of claim 12 of the patent. This patent mentions, as suitable noble metal compounds, chlorides, hydroxides, oxides, sulfates and ammine complexes (ammonia salts or the like) of palladium, silver, platinum, gold and the like (paragraph spanning col. 2 to col. 3) and there is no teaching or suggestion to a skilled person to consider using naphthenic acid or a fatty acid having 5 to 25 carbon atoms with an expectation of some desirable effect. As argued with the above obviousness-type double patenting rejections over the foregoing two references, the pretreating agent of this present invention shows unexpected results over the reference, as supported by the examples of the present invention using the specified noble metal soap in comparison with the comparative example using palladium chloride. As such, the obviousness-type double patenting rejection in view of claims 9-12 of U.S. Patent No. 6 780 467 has to be withdrawn.

WO 01/49898 discloses a metal plating pretreatment agent obtained by reacting or mixing in advance a noble metal compound such as a palladium compound with a silane-coupling

agent obtained by reacting an imidazole-based compound and an epoxysilane-based compound. This reference is also directed to a metal plating method comprising treating the surface of an object to be plated, such as a polyimide article, with the pretreatment agent and then electroless plating the object. As mentioned above, this reference discloses as suitable noble metal compounds, chlorides, hydroxides, oxides, sulfates, ammonium salts and amine complexes of palladium, silver, platinum and gold and, among them, palladium chloride is mentioned as a particularly preferred compound (col. 4, lines 27-33). All the examples of this reference use palladium chloride dissolved in water, not in an organic solvent. This reference makes no mention about the precipitation problem occurring when using an organic solvent and solved by the present invention. Therefore, there is no teaching or suggestion to a skilled person to consider using a naphthenic acid or a fatty acid having 5 to 25 carbon atoms with any expectation of some desirable effect, recognizing the problem due to the precipitation of palladium. As mentioned above, this invention requires the use of the noble metal soap of naphthenic acid or a fatty acid having 5 to 25 carbon atoms and the results of the examples of this application show that the effects derived from the specified noble metal soap cannot be obtained by the palladium compound disclosed in WO 01/49898. Since WO 01/49898 fails to disclose the noble metal soap of this invention, Yamamoto et al is combined with WO 01/49898.

Yamamoto discloses a metal-plated aromatic polyimide film composed of an aromatic polyimide resin film, a surface layer which contains a dispersed palladium metal or a palladium compound and a metal layer which is chemically plated on the surface layer of the polyimide resin film. The surface layer is formed by placing a palladium compound such as palladium salts of a carboxylic acid having 6 to 30 carbon atoms on a self-supporting aromatic polyimide precursor film and heating the self-supporting film having the palladium compound on its

surface layer to a temperature of such as 420°C or higher, at which temperature the polyimide precursor is converted into its corresponding aromatic polyimide. The Examiner has stated that it would have been obvious to one having ordinary skill in the art to replace the palladium chloride of WO 01/49898 with the carboxylic acid salts of palladium disclosed in Yamamoto to arrive at the present invention.

WO 01/49898 requires that the pretreatment agent be obtained by reacting or mixing in advance a palladium compound with a silane-coupling agent. Therefore, these two components are simultaneously applied to an object and are not allowed to be separately applied to the object. For support, WO 01/49898 shows comparative example 1 in which the above two components are separately applied onto a polyester film and the intended results cannot be obtained. Further, comparative example 7 of WO 01/49898 shows that the palladium compound cannot be used without the silane coupling agent, unlike Yamamoto. Therefore, WO 01/49898 and Yamamoto are entirely different from each other in this regard.

Further, Yamamoto requires heating at a high temperature of 420°C or higher for conversion of a polyimide precursor film into its corresponding polyimide. For example, in example 1 of Yamamoto, a polyimide precursor film on which a palladium component is dispersed is dried at 135°C and then subjected to heat treating at 200°C for 2 min., 250°C for 2 min., and 470°C for 2 min. Such a high-temperature heat-treatment is unacceptable to the pretreatment agent of WO 01/49898 because the silane coupling agent is subjected to thermal decomposition. Therefore, there is no reasonable basis for combination of these different inventions disclosed in WO 01/49898 and Yamamoto, recognizing the precipitation problem not discussed in both references. WO 01/49898 excludes the use of a noble metal compound without a silane coupling agent and requires the use of a noble metal compound in combination with a silane coupling agent which cannot be used at the high-temperature heat-treatment required in



Yamamoto. Neither of the two references mention about the above-mentioned precipitation problem. Therefore, no person would have been motivated to replace the noble metal compound of WO 01/49898 with the palladium compound disclosed in Yamamoto in order to provide a pretreating agent for electroless plating that is soluble and stable in organic solvents and enable the attainment of plated products having a uniform and highly adhesive electroless film coating without causing the precipitation problem.

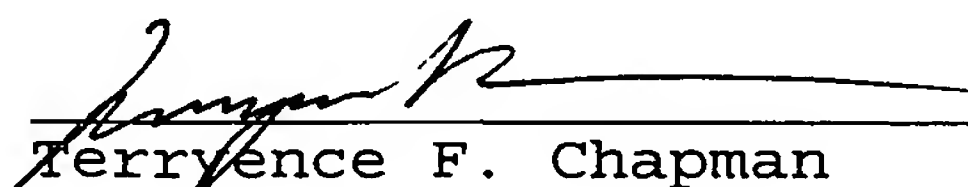
WO 01/081652 discloses a pretreatment agent for metal plating prepared by capturing a metal with a silane coupling agent and then adding a reducing agent. As in the case of WO 01/49898, WO 01/081652 also mentions, as suitable noble metal compounds, chlorides, hydroxides, oxides, sulfates and ammine complexes (ammonia salts or the like) of palladium, silver, platinum, gold and the like (paragraph spanning col. 2 to col. 3) and palladium chloride is stated as a especially desirable one. All of the examples of this reference use palladium chloride dissolved in water, not in an organic solvent. Also, this reference makes no mention of the precipitation problem occurring when using an organic solvent and solved by the present invention.

In order to cure the disclosure deficiency of WO 01/081652, Yamamoto is combined with WO 01/081652. The Examiner has stated that the present invention would have been made by an obvious substitution of the noble metal compound of WO 01/081652 with the palladium compound of Yamamoto. The argument above in the rejection in view of WO 01/49898 and Yamamoto are also applicable here and the results of the examples of the present application show that the use of the specified noble metal soap is not an obvious substitution for the noble metal compounds disclosed in WO 01/081652. Also, in this reference, a silane coupling agent, which cannot be used at the high-temperature heating of Yamamoto, is present together with the noble metal component in the pretreatment agent and these two components are applied simultaneously onto

an object for pretreatment. Further, WO 01/081652 requires the use of a reducing agent and the present invention is also distinguishable in this regard.

For the reasons advanced above, it is respectfully submitted that the presently claimed invention clearly is patentably distinguishable over the prior art cited by the Examiner. Reconsideration of the present application and the passing of it to issue is respectfully solicited.

Respectfully submitted,

  
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